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The NIF will contribute to national security, energy research, fundamental science, and economic development

Mission

The National Ignition Facility (NIF) is being designed to produce energy gain in inertial-confinement fusion (ICF) capsules. The NIF will contain an extremely powerful laser that will "ignite" small capsules containing fusion fuel, liberating more energy than is used to start the fusion reaction. Experiments conducted with the NIF will contribute to national security, maintain U.S. world leadership in ICF research, and benefit the scientific and technical community.

A Critical Role in National Security

The NIF will play a critical role in the Department of Energy's science-based Stockpile Stewardship and Management Program. This program to ensure the reliability, safety, and effectiveness of the enduring stockpile in the absence of underground testing will rely on advanced computational capabilities and aboveground experimental facilities. The NIF is among the most important of these facilities; it will provide the only U.S. experimental capability to create high-energy-density physics regimes relevant to nuclear weapon technology.

Diverse R&D Opportunities

The NIF will provide world-class research opportunities in diverse scientific areas. Its experiments will create conditions similar to those at the center of the sun and other stars. The NIF will be available to scientists throughout the research community, including universities, other federal laboratories, and private industry. Because of its unique capabilities, the NIF will attract world-class scientists working in such diverse scientific areas as:

- Astrophysics.
- X-ray physics.
- Plasma physics.
- Computational physics.
- Advanced diagnostics.
- Fusion energy.

The predecessor to the NIF, Livermore's Nova laser, clearly established the scientific and technical value of such ICF facilities and demonstrated the scope of multidisciplinary, multiprogram research that can be conducted with such facilities. Attracting top-notch scientific talent to Livermore is critical to maintaining the core intellectual and technical capabilities required for our national-security mission. The NIF, like Nova, will be a magnet for talented scientists.

Inertial Fusion Energy Feasibility

The NIF will enable the U.S. to retain its role as a world leader in the development of inertial fusion energy as an environmentally attractive energy source. An inertial fusion power plant holds promise as a more environmentally benign source of power than any other form of large-scale power production. The NIF's technical goal—the achievement of fusion ignition and energy gain—will demonstrate the scientific feasibility of fusion energy through ICF. The NIF will also be used to establish the requirements for key components of an electrical power plant based on fusion.

NIF Project Milestones

- Approval of Key Decision One by the Secretary of Energy on October 21, 1994.
- Completion of updated Quality Assurance Plan, Project Execution Plan, Title I Plan, Preliminary Safety Analysis Report, and Conceptual Design Report.
- Hosting of an Industrial Stakeholders Briefing at which 350 U.S. industries from 35 states were briefed about the NIF construction requirements.
- Advancement of the NIF conceptual design activities in collaboration with the Los Alamos and Sandia national laboratories and the University of Rochester's Laboratory for Laser Energetics.
- Selection of Ralph Parsons Inc., as the architect and engineering contractor for the NIF.
- Finding by the DOE study (draft report) on the effect of the NIF on U.S. arms control and nonproliferation policy that the "technical proliferation concerns of the NIF are manageable and therefore can be made acceptable."

Benefits to the U.S. Economy

As the world's largest precision optical instrument, the NIF will maintain and advance U.S. industry leadership in lasers, optics, and other advanced technologies. As with Livermore's earlier laser facilities, the NIF will drive improvements in laser and electro-optics technologies, high-speed instrumentation, microfabrication, and advanced imaging devices. Commercial applications derived from the NIF will likely include flexible and low-cost, laser-based manufacturing, advanced x-ray lithography for integrated circuit manufacturing, high-density information storage technologies, advanced technologies for health care, new materials, and scientific and analytical instrumentation.

Contact

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